Early Childhood Malnutrition Checking & Donation Management System

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Declaration

"I hereby declare that this work of any part of this work has not been submitted in any format to CINEC Campus or any other academic institution for any purpose. I have properly cited and expressed acknowledgements where appropriate for the materials which I have obtained externally and included the list of references in the bibliography section. I also confirm that this work is my own intellectually and no unfair help from external personnel was involved. This work had been done for the partial fulfilment of Bachelor of Science in Engineering in Electronic and Telecommunication Engineering."

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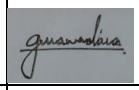
Signature	
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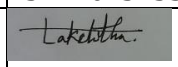
Signature	
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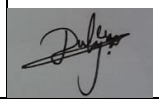
Signature	

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Abstract

Early Childhood Malnutrition Checking & Donation Management System

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Malnutrition children in Sri Lanka between the ages of 6 months and 5 years is a serious problem. Although the incidence of stunning has decreased, the country still has challenges in ensuring that children have enough access to nourishing food and receive the proper care for optimum growth and development. To address these challenges, we select an area & create web-based application that integrates tools for checking and managing infant & early childhood malnutrition cases and donations when needed. The system will consist of two main components: a child nutrition monitoring system and a donation management system. The child nutrition monitoring system will utilize a web-based platform to track and record children's nutritional status in month wise. The donation management system will be a web-based platform that enables individuals, organizations, and corporations to donate funds to low income malnutritional families in targeted area. Donors can choose to support specific children from database, and the system will provide them with real-time updates on the impact of their donations, including the number of children who have been helped. The donation management system will also include features such as secure payment processing, notification alerts, and donation tracking. The Early Childhood Malnutrition Checking & Donation web-based Management System will leverage the latest technologies, including OCR algorithms and data analytics, to provide real-time insight BMI graphs into the prevalence and severity of malnutrition in targeted area.

Acknowledgement

We would like to express our sincere gratitude to all those who have contributed to the successful completion of the Early Childhood Malnutrition Checking & Donation Management System.

Firstly, we would like to thank our group project lecturer MR. Dishan Dharmearatchi, forproviding us with valuable guidance, support, and motivation throughout the project. We appreciate the time and effort invested by Mrs. Prabha Mihirani and Miss. Sachini Vindya Gunasekara in helping us achieve our project goals.

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Furthermore, we would like to thank the team members who worked tirelessly to develop and test the Early Childhood Malnutrition Checking & Donation Management System. Their hard work, dedication, and commitment to the project are commendable.

The successful completion of this project would not have been possible without the support and contributions of everyone mentioned above. We are grateful for their involvement and take pride in the outcome of our project.

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CHAPTER 1-INTRODUCTION

Background

Millions of children in Sri Lanka, particularly in low-income families and underserved communities, are affected by malnutrition, which is a serious health problem [1].
The challenges posed by malnutrition are aimed to be overcome by the Early Childhood Malnutrition Checking & Donation Management System project through the provision of a comprehensive system for collecting and managing data related to malnutrition, as well as by facilitating the donation and distribution of resources to support malnourished children [2].

The lack of a comprehensive system for collecting and managing data related to malnutrition, as well as the challenges related to resource distribution, are the problems aimed to be addressed by the project. Currently, data collection related to malnutrition is often inconsistent or incomplete, and resources are often distributed unevenly, resulting in some children receiving inadequate support while others receive more than they need [3]. The need to address the pressing global problem of malnutrition, particularly in children, is what justifies the Early Childhood Malnutrition Checking & Donation Management System project. By improving data collection and resource distribution, health outcomes for children in selected areas have the potential to be improved by the project [4].

Additionally, a powerful tool for tracking and addressing malnutrition more effectively can be provided to midwives, allowing earlier intervention and prevention of more serious health problems from developing. The Prototyping software development methodology will be used for the Early Childhood Malnutrition Checking & Donation Management System. With this methodology, working prototypes of the system will be created to gather feedback from stakeholders and refine the design before building the final system [5].

1.1 Aim

This section covers the aim of this projects as indicated below:

Create a user-friendly, efficient, and effective web-based platform to connect donors and malnutritional children, by checking them in certified method using Arduino based BMI checking system.

1.2 Academic Question

Single academic question linked with the project in indicated below:

How can we check and manage early childhood malnutrition cases on the incidence of malnutrition in selected area?

1.3 Academic Objectives

The objectives of the project group are hoping to achieve is indicated below:

A survey will be conducted to identify the limitations and faults in managing early childhood malnutrition incidents in Sri Lanka as the first objective of the Early Childhood Malnutrition Checking & Donation Management System. Information will be gathered from healthcare professionals, parents, and other stakeholders involved in the management of malnutrition in young children. The survey will help identify the challenges and limitations faced in managing early childhood malnutrition and inform the development of strategies to overcome these challenges.

The second objective of the project is to create a method to check BMI automatically using Arduino. An Arduino-based system will be designed to calculate and display the BMI of early childhood children quickly and accurately. Real-time BMI readings will be provided through an Arduino board, sensors, and a display. The use of Arduino technology will allow for easy implementation and scalability of the system in healthcare facilities across selected areas.

A certified method will be introduced to filter malnourished children for connecting donors using web-based applications as the third objective of the project. A web-based application will be developed to connect donors with malnourished children who require support. Malnourished children will be filtered based on specific criteria such as age, gender, BMI,

and location through a certified method. This will ensure that the children receiving donations are genuinely in need and that the funds go to the most vulnerable children.

The fourth objective of the project is to add details of malnourished children to a database and present them to donors in an effective manner. A database of malnourished children will be created that includes information such as their name, age, gender, BMI, and location. Potential donors will be presented with this information in an easy-to-understand manner to encourage donations. The presentation will be designed to provide donors with a clear understanding of the children's condition and the impact of their donations.

Donors and children will be connected through web applications and their transactions will be ensured as the fifth objective of the project. A web-based application will be developed to facilitate transactions between donors and malnourished children. The application will be designed to enable donors to make secure and transparent donations to the children in need. The system will also ensure that the funds reach the intended recipients, and the donors receive feedback on the impact of their contributions.

1.4 Scope of the Project

The scope of a project refers to the specific goals, deliverables, tasks, timelines, and resources that define the work that needs to be done to achieve the project objectives.

The "Malnutrition Checking & Donation Web-Based Management System" is a comprehensive solution that aims to address malnutrition in early childhood. This system utilizes Arduino to measure a child's BMI, which is a crucial indicator of malnutrition. The data collected through BMI measurement is then fed into a web-based management system that is accessible to midwives.

The system provides real-time information on the health status of children, enabling midwives to take proactive measures to prevent malnutrition. This feature is particularly important as malnutrition can have severe consequences, such as stunted growth, developmental delays, and increased susceptibility to infectious diseases.

In addition, the system allows for the tracking of donations made to address malnutrition, ensuring that resources are utilized efficiently. This feature is essential as it enables the system to monitor the impact of donations and allocate resources effectively.

By providing real-time information and tracking donations, the system can help midwives take proactive measures to prevent malnutrition and ensure that resources are utilized effectively.

1.5 Structure of the Report

The areas that will be discussed in the document, chapter-wise, are briefly presented below:

First chapter for the rest of the document is set. Background information about the problem or issue the proposed project aims to address is provided. The Academic Question, Academic Objectives, Scope of the Project, and Structure of the Report are included. Additionally, the research methodology that will be used in the study is highlighted.

Second chapter for literature in the field is comprehensively overviewed in this chapter, which is the second chapter of the document. The existing literature on the research topic is critically examined and synthesized, identifying gaps and inconsistencies that the proposed project aims to address. The need for the proposed study is demonstrated, and how the proposed research will contribute to the existing knowledge in the field is shown.

In third chapter, a detailed description of the research methodology that will be used to achieve the research objectives is provided. The research design, data collection and analysis methods, and any other relevant details are outlined. The methodology will be based on the SDLC (Software Development Life Cycle) framework. The SDLC is a structured approach to software development that consists of different phases, including planning, analysis, design, development, testing, and maintenance. The way the SDLC framework will be used in the proposed project is described, including the specific steps and activities that will be undertaken in each phase.

In Chapter Four, the expected budget for the development of the web application will be discussed. An analysis of the resources required for each phase, including personnel, hardware, and software, will be included. Additionally, any additional expenses that may arise throughout the project, such as travel or other miscellaneous costs, will be considered.

CHAPTER 2- LITERATURE REVIEW

2.1 Introduction

Malnutrition in early childhood is a major public health concern in developing countries. According to UNICEF, an estimated 144 million children under the age of five are stunted due to malnutrition. In recent years, there has been a growing interest in the use of technology to address this problem [6]. While contemplating with the exception of nutrition outcomes, Sri Lanka is known for having good health outcomes at minimal cost while being a nation with low levels of per capita income. The prevalence of malnutrition heralds a global epidemic that presents difficulties for public health. All forms of malnutrition are most prevalent in Africa and Asia. [7]. The importance of early childhood nutrition to development outcomes is well recognized. Malnutrition in children under five years of age (U-5) is widespread. Stunting, wasting and underweight are all at levels identified by the WHO as being public health problems, wasting being at the level of 'very high' while stunting is at a medium level of public health significance [8].

In recent years, there has been a growing interest in the use of technology to address this problem [9]. One such technology is the Arduino-based BMI measurement device, which has been shown to be an accurate and cost-effective way to measure the nutritional status of children in resource-limited settings [10]. Web-based management systems have also been used to track and manage malnutrition in children. These systems allow for real-time data collection, monitoring, and analysis, which can aid in the early detection and management of malnutrition [11]. Furthermore, they can also facilitate the donation and distribution of resources to address malnutrition [12]. Midwives play a vital role in the implementation of programs aimed at addressing malnutrition in early childhood. They are often the first point of contact for mothers and children, and their involvement can improve the uptake and effectiveness of interventions [13]. Several studies have evaluated the use of technology-based tools, such as the Arduino-based BMI measurement device and web-based management systems, in addressing malnutrition in early childhood. For instance, a study conducted in Burundi found that the Arduino-based BMI measurement device was effective in screening for malnutrition in children [14]. Another study conducted in Tanzania found that a web-based system for monitoring and managing malnutrition was effective in improving the quality of care provided by mid wives [15].

2.2 Similar Projects

Research Gap

The **"Food for All" web application** [16] is a platform designed to connect donors, requesters, and organizations to help fight hunger and improve sustainable agriculture. This literature review will analyze the functionalities of the system and its effectiveness in achieving its objectives. The primary objective of the system is to connect individuals who have excess resources and those who are in need of food. The system's admin reviews each fundraiser program created by registered organizations, ensuring that only legitimate requests are available on the platform. The system's security features ensure that users' actions are monitored and reviewed by the admin, promoting trustworthiness and minimizing fraudulent activities. The platform's simple and user-friendly interfaces, such as side navigations, menus, various icons, and buttons, enable easy navigation and understanding of the system. However, the system's effectiveness in combating hunger is dependent on its user adoption rate and the ability to promote awareness of the platform. The platform must leverage various marketing channels to reach a larger audience and encourage them to participate in helping those in need.

SeVa [17], designed to address the issues of food waste and hunger by creating a platform that allows users to visualize available food resources in their local area and gain access to surplus food. The app is developed using principles from AI and HCI, and it incorporates parameters such as geographic and temporal constraints to ensure the freshness of the food upon delivery. The paper also evaluates the SeVa app using user surveys, and the results are very positive, with wide demographics showing interest in the app. It provides a platform for food suppliers to donate food by entering the type of food, quantity, date of expiry, and whether the items are perishable, among other mandatory entries. The app also incorporates geographic and temporal parameters to ensure the freshness of the food upon delivery. The SeVa app's implementation is based on AI and HCI principles, making it intuitive and easy to use for users. The paper's future work entails releasing the SeVa app on the Android marketplace after a few enhancements based on the reception of the prototype. The SeVa app has the potential to be very useful to app developers, NGO employees, HCI and IoT researchers, and professionals from AI in Smart Cities. Overall, the paper presents an innovative solution to the critical problem of food waste and hunger by developing a mobile application called SeVa. The app's functionalities, including the knowledge base, geographic and temporal parameters, and the incorporation of AI and HCI principles, make it intuitive and easy to use.

Happy To Help (HTH) [18] aim to simplify the donation process by providing a list of non-profit organizations and connecting donors with these organizations. The application offers various features, such as the ability to donate money, food, blood, and pre-owned items, as well as participate in voluntary charity events. It provides a platform for donors, non-profit organizations,

volunteers, and social organizations to interact and contribute to the betterment of society. The application implements the layered architecture in the development process, ensuring that the system is well-structured and scalable. It also provides authorized features to ensure that private and confidential data are only accessible to authorized users. The system also maintains a record of every donor, keeping track of blood stock during emergency cases. The application offers two modes, namely donor and requester modes. The application also provides a volunteer page where individuals can participate in voluntary charity events. The website and application offer a user-friendly interface for users, including NGOs, volunteers, social organizations, and donors, making it easy for them to search for suitable events and make donations and website provide a comprehensive solution for donating money, food, blood, and pre-owned items, as well as participating in voluntary charity events.

E-Sharing: Developing a Web Based Online Donation System [19] presents a proposed solution to address the problem of food and resource wastage and the lack of connection between donors and NGOs in Saudi Arabia. The proposed solution is a web-based online charitable donation system that collects and delivers donations such as clothes, toys, and school tools to children in need. The system also provides opportunities for volunteers to deliver the donations to the homes of the poor for free. Additionally, it would bridge the connection gap between donors and NGOs, ensuring that donations reach the people who need them the most. System was designed and developed using the Unified Modeling Language, SQL Server for implementing the database, and ASP.net and Visual Basic programming languages. The article notes that the system was evaluated by inviting 20 students from the Imam Abdurrahman Bin Faisal University to use the proposed system.

Food wastage is a growing problem around the world, and the '**Food for All' mobile application** [20] aims to tackle this issue by providing a platform for donors and volunteers from NGOs to communicate with each other and avoid the wastage of food. The app's functionality allows volunteers to claim or reject food donations, and the accepted and rejected food details are displayed separately on the accepted food donation entries and rejected food donation entries. This feature helps in managing the availability of food and reducing wastage. The app also automatically deletes the availability of food from the food donation entry once it exceeds its date and time limit, which ensures that donors only enter food that is still fresh and suitable for consumption. In addition to reducing food wastage, the Food for All app is expected to update its functionalities to add up utility and efficiency of the application, including clothes, stationary, books, etc. This update will make the app more versatile and expand its usability to other NGOs, orphanages, old age homes, and other organizations. The app's expansion would help in solving more problems such as clothes wastage and other necessities. The app's development is a significant step towards the reduction of food wastage and will play a crucial role in mitigating food insecurity by providing a platform for food donation.

'Designing a Donation Portal to Help Underprivileged Indians' [21] discusses the need for a web application that can facilitate online donations to underprivileged people in India. It highlights that the lack of awareness of the problems faced by underprivileged people is a significant factor that prevents people from donating to them. To address this problem, the author proposes a web

application that can provide a single platform for making donations to various organizations that work for the underprivileged. This feature enables organizations to showcase their work and the impact they have made, which can encourage more people to donate. Additionally, the application provides notifications to donors regarding the impact they have made. This feature can motivate donors to continue supporting the cause and create a sense of satisfaction in them. Furthermore, the web application has a live streaming feature that can allow organizations to interact with donors in real-time. This feature can also help organizations to build trust with donors and establish long-term relationships with them. Also has a user-friendly interface that makes it easy for donors to make donations. The flow of the application is acceptable, which means that users can navigate it easily and understand its functionalities.

'Smart-Log': An Automated, Predictive Nutrition Monitoring System [22] with predictions to help a balanced meal aims to address the issue of malnutrition in infants by accurately tracking their food intake. The system is composed of a piezo-based sensor board and a smartphone camera to obtain nutrition facts of the ingredients. They also used a JAVA program to acquire nutrition values by scanning a large database of 8791 items consisting of both readily available and raw ingredients for baby food. The database was obtained from the SR8 database available through the US Department of Agriculture website, which provides a food report and a nutrient report for a particular food item. To evaluate the efficiency of the system, the researchers used the Waikato Environment for Knowledge Analysis tool to build a classifier based on different algorithms. They used different classifiers in WEKA to evaluate the efficiency of the system, and observed that when a Bayesian classifier was used, the accuracy of the system was very high, ranging up to 98.4% in the worst case. The proposed automated food monitoring system with predictions to help a balanced meal is a promising solution to the problem of malnutrition in infants.

BMI measurement system as a desktop-based nutrition monitor [23] that measures the Body Mass Index of an individual using electronic and mechanical hardware components. The system uses a load cell sensor to measure body mass and an ultrasonic sensor to measure body length, which is then processed by the Arduino Uno module. The results are displayed on an LCD display and stored in a PC database as data for BMI, which is used to determine an individual's nutritional status. The use of BMI as an indicator of nutritional status is also widely accepted. BMI is calculated by dividing an individual's weight in kilograms by the square of their height in meters. The use of electronic and mechanical hardware components ensures that the measurements are precise and consistent. The Arduino Uno module is an excellent choice for signal processing, as it is cost-effective, widely available, and easy to use. The LCD display allows for quick and easy reading of the results, and the PC database provides a convenient way to store and analyze data. One potential limitation of the system is that it relies on self-reported height and weight.

Uniqueness

The "Food for All," "SeVa," "Happy to Help (HTH)," and "E-Sharing" web-based applications all have their unique functionalities and objectives. These platforms aim to address various social issues such as hunger, food waste, and lack of connection between donors and NGOs.

The “Food for All” platform provides a comprehensive solution for fighting hunger and improving sustainable agriculture. The system connects donors, requesters, and organizations to facilitate the donation of excess resources to those in need. The platform ensures legitimacy by having the system admin review all fundraiser programs created by registered organizations, and it has security features to monitor users' actions and minimize fraudulent activities. The platform's user-friendly interface enables easy navigation and understanding of the system. "Happy to Help (HTH)" allows food suppliers to donate food and provides geographic and temporal parameters to ensure food freshness upon delivery. The app's intuitive and easy-to-use interface is based on AI and HCI principles. The platform's future work includes releasing the app on the Android marketplace and making enhancements based on the reception of the prototype. Overall, the “SeVa” app presents an innovative solution to the critical problem of food waste and hunger. The platform also maintains a record of every donor and keeps track of blood stock during emergency cases. “Smart-Log” don’t have web donation management system. The platform provides two modes, donor and requester, as well as a volunteer page. The website and application offer a user-friendly interface, making it easy for NGOs, volunteers, social organizations, and donors to search for suitable events and make donations. “E-Sharing” is a web-based online charitable donation system that collects and delivers donations such as clothes, toys, and school tools to children in need.

In comparison to these platforms, the "Malnutrition Checking & Donation Web-Based Management System" aims to address childhood malnutrition by utilizing an Arduino-based BMI checking system to measure a child's BMI and feed the data into a web-based management system accessible to midwives. The system provides real-time information on the health status of children, enabling midwives to take proactive measures to prevent malnutrition. The platform also tracks donations made to address malnutrition, ensuring that resources are utilized efficiently. The system's uniqueness lies in its focus on childhood malnutrition and utilizing an Arduino-based BMI checking system to provide real-time information on a child's health status, enablingproactive measures to be taken to prevent malnutrition.

CHAPTER 3- METHODOLOGY

3.1 Planning

3.1.1 Identifying Business Values

The proposed system is designed to tackle childhood malnutrition and its impact on various stakeholders. Midwives, as key players in child healthcare, will be empowered by the system to more accurately identify and track malnourished children. This will lead to more effective care and treatment, resulting in improved outcomes for both individual children and the healthcare system as a whole. Children who are at risk of malnutrition will be the primary beneficiaries of the project, as the system's early detection and intervention will ensure that they receive the care and support they need to thrive.

Donors will also benefit from a centralized donation management platform, which will make it easier for them to direct their resources towards the children who need them most. This will ensure that donations are used effectively and efficiently, maximizing their impact. Finally, the health sector of governments will be provided with valuable data and insights to develop more effective policies and programs to address childhood malnutrition. This will not only benefit the affected children directly but also society as a whole, as healthy children are crucial for the development of any society.

3.1.2 Feasibility Analysis

The practicality of a proposed plan or project is assessed by conducting a feasibility analysis. This involves evaluating the technical, economic, legal, operational, and scheduling aspects of the project to determine its feasibility and sustainability.

3.1.2.1 Technical Feasibility

This refers to the evaluation of whether a proposed project or system can be implemented using current technology and infrastructure. It involves assessing the availability of resources, expertise, and tools required to develop and maintain the system.

Technical feasibility of the Early Childhood Malnutrition Checking & Donation Management System project has been assessed and determined to be feasible. Existing technologies and software tools will be leveraged for the project's development. A web application will be developed

to allow mid wives to capture and upload data about malnourished children, and cloud-based storage will be used to store the data captured. Machine learning algorithms will be used to analyze the data collected to identify patterns and predict trends.

Potential risks associated with the project have been identified. Data security risks could arise if proper security measures are not taken. Technical glitches such as server downtime, software bugs, and network outages may occur and affect the project's success. Funding is also a risk, as the project relies on donor funding to achieve its objectives. Mid wives and beneficiaries may be resistant to change, and ethical considerations must be considered.

To mitigate these risks, data encryption will be implemented to ensure data security. Regular system backups will be taken to minimize the risk of data loss. The project team will work with technical experts to minimize the likelihood of technical glitches. Additional funding sources will be explored to reduce reliance on donor funding. The project team will work with stakeholders to address their concerns and ensure their buy-in. Ethical considerations will be addressed through informed consent procedures and privacy protection measures.

3.1.2.2 Financial Feasibility

This involves analyzing the financial viability of a proposed project or system. It includes estimating the costs of development, implementation, and ongoing maintenance, as well as evaluating the potential return on investment and the availability of funding.

The project's primary source of funding is donations from individuals and organizations. A risk associated with this approach is that funding may not be consistent, resulting in insufficient funds to sustain the project. Additionally, there may be additional costs associated with the project that were not anticipated, which could further strain the project's financial resources.

To mitigate these risks, the project team will explore alternative sources of funding to supplement donations, such as grants from government agencies or partnerships with private sector organizations. Additionally, the project team will work to ensure that the project is cost-effective, with expenditures being minimized where possible. Regular budget reviews will be conducted to ensure that the project remains financially sustainable.

Another potential risk is that the project may not generate enough donations to meet its financial requirements. To mitigate this risk, the project team will develop a comprehensive marketing and outreach plan to promote the project and attract donations. This may include social media campaigns, fundraising events, and partnerships with other organizations.

3.1.2.3 Operational Feasibility

This refers to assessing whether a proposed system or project can be integrated into the existing business processes and workflows. It involves evaluating the impact of the proposed system on day-to-day operations, identifying potential challenges and risks, and ensuring that stakeholders are willing and able to adopt the new system.

One potential risk is that the project may not be well-received by health workers or beneficiaries. This may be due to a lack of understanding or familiarity with the technology used in the project, or a resistance to change. To mitigate this risk, the project team will conduct extensive training sessions for health workers to ensure they are familiar with the project's goals and how to use the mobile application effectively. Additionally, the project team will work with beneficiaries to ensure that they are informed about the project and understand how it will benefit them.

Another operational risk is that the project may require significant resources, such as staff time and effort. This may be particularly challenging in areas where health resources are limited. To mitigate this risk, the project team will work with local stakeholders to ensure that the project is integrated into existing health systems and processes. This may include leveraging existing resources or working with local organizations to provide additional support.

There is also a risk that the project may not be sustainable over the long term. This may be due to a lack of resources, changes in the local health landscape, or other factors. To mitigate this risk, the project team will work to ensure that the project is designed with sustainability in mind. This may include developing partnerships with local organizations to ensure ongoing support and maintenance of the project.

3.1.2.4 Legal Feasibility

This involves evaluating whether a proposed system or project complies with relevant laws and regulations, such as data privacy laws, intellectual property laws, and industry-specific regulations. It also involves identifying potential legal risks and liabilities associated with the proposed system.

One potential risk is that the project may violate privacy laws or regulations. This may be due to the sensitive nature of the data being collected or a lack of understanding about legal requirements. To mitigate this risk, the project team will work with legal experts to ensure that the project complies with all relevant laws and regulations. This may include developing privacy policies, data protection measures, and informed consent procedures.

Another legal risk is that the project may not comply with local or national laws and regulations. This may be due to differences in legal systems or a lack of understanding about local legal requirements. To mitigate this risk, the project team will conduct thorough research into local legal requirements and work with local stakeholders to ensure that the project is legally compliant.

There is also a risk that the project may infringe on intellectual property rights. This may be due to the use of existing technologies or software without proper licensing or permissions. To mitigate this risk, the project team will ensure that all technologies and software used in the project are properly licensed and that any necessary permissions have been obtained.

3.1.2.5 Schedule Feasibility

This involves assessing whether a proposed project or system can be completed within the desired timeframe. It includes identifying potential obstacles and risks that could impact the project timeline, as well as evaluating the availability of resources and expertise required to complete the project on schedule.

One potential risk is that the project may face delays due to unforeseen circumstances, such as inclement weather or unforeseen events. To mitigate this risk, the project team will develop contingency plans to address potential delays. These plans may include adjusting the project timeline, shifting resources to different areas, or other measures to ensure that the project stays on track.

Another schedule risk is that the project may take longer than anticipated to implement due to resource constraints. This may be due to limited availability of staff or funding, or other factors. To mitigate this risk, the project team will work to ensure that resources are allocated effectively and that project timelines are realistic. Regular progress reviews will be conducted to ensure that the project stays on track and that any potential delays are identified and addressed in a timely manner.

There is also a risk that the project may not be completed within the designated timeline. This may be due to unexpected challenges or delays, or a lack of progress in certain areas. To mitigate this risk, the project team will establish clear project milestones and progress indicators. These will be used to track progress and identify potential areas of concern. Additionally, the project team will work to ensure that project tasks are properly sequenced and that critical tasks are given priority to avoid delays.

3.1.3 Work Plan

3.1.3.1 WBS

A Work Breakdown Structure (WBS) is a visual representation of the project's scope and the work required to complete it. It breaks down the project into smaller, more manageable tasks that can be assigned to team members and tracked for progress.

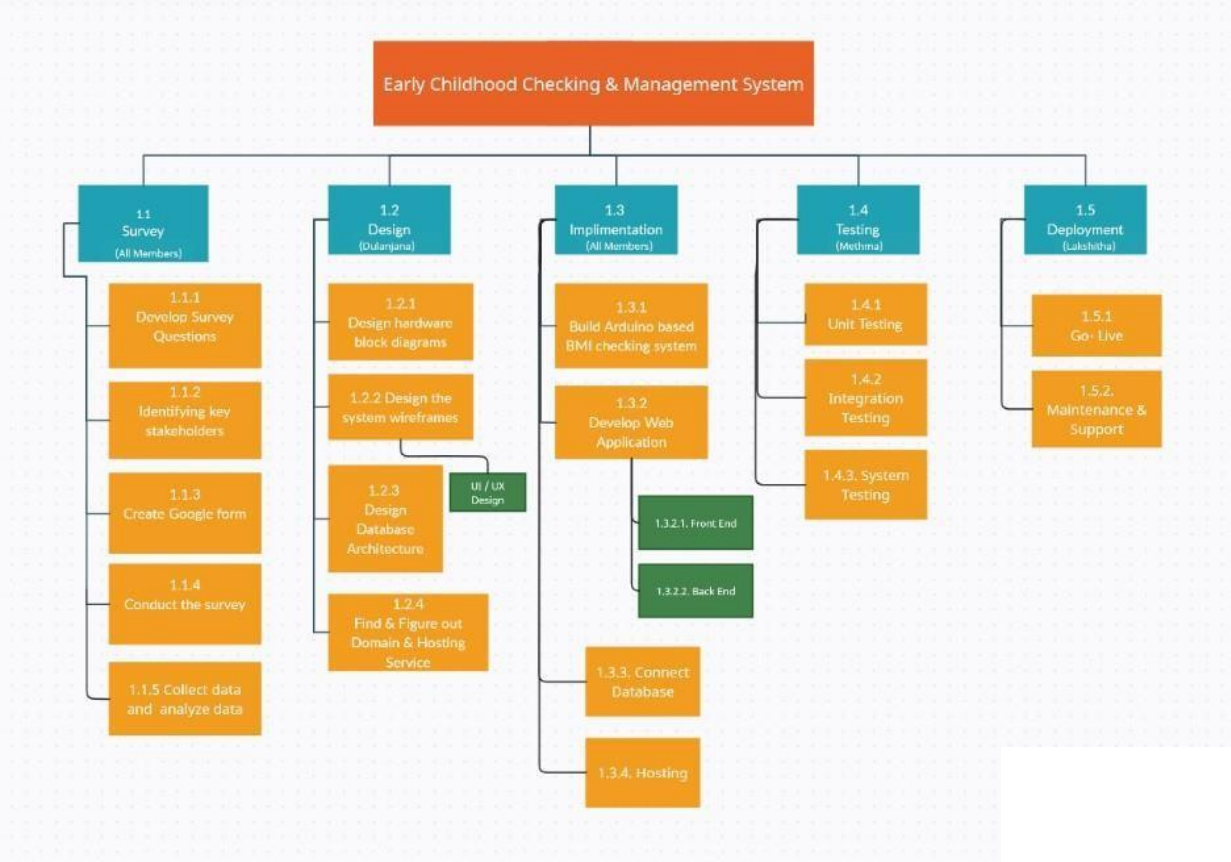

Figure 3.1: Work breakdown structure

3.1.3.2 Gantt Chart

A visual representation of a project schedule that shows the start and end dates of each task, as well as their duration, dependencies, and progress is provided by a Gantt chart. It is used in project management as a popular tool to help plan, track, and communicate project progress.

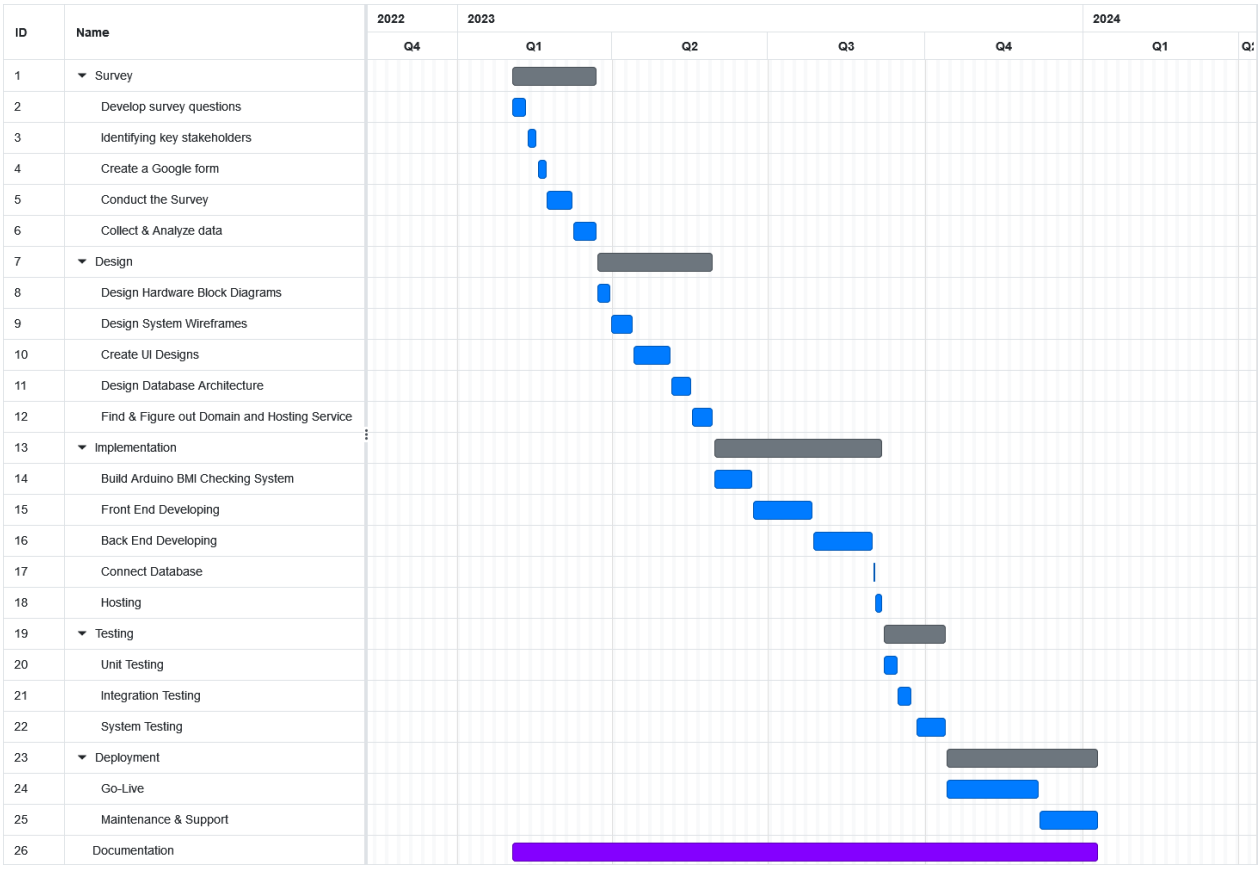

Figure 3.2: Gantt chart

3.2 Analysis and Requirement Gathering

3.2.1 Requirement Gathering

Both primary and secondary data gathering methods will be used to carry out the requirements gathering process for the Early Childhood Malnutrition Checking & Donation Management System project.

Primary data gathering methods will involve collecting data directly from stakeholders and end-users through interviews, surveys and other techniques. Information about the needs and requirements of the project will be gathered through these methods. Midwives will be interviewed one-on-one to gather information about their experiences and perspectives on childhood malnutrition and potential solutions. Online surveys will also be distributed to a wide range of stakeholders, donors, policymakers, and community advocates to gather their feedback on the proposed system.

Secondary data gathering methods, on the other hand, will involve collecting data from existing sources such as published research, reports, and other relevant documents. These methods will provide context and background information to inform the development of the project. A comprehensive literature review will be conducted on childhood malnutrition, nutrition interventions, and donation management systems to inform the design and development of the system. Desk research will also be conducted by gathering data from existing sources such as academic papers, research reports, government publications, and online sources. Case studies will also be used to gather detailed information about specific examples of the problem area, which can provide insights into how the problem is being tackled in different contexts and identify opportunities for innovation.

3.2.2 Analysis

Our project aims to develop a system that can assist organizations in early detection of malnutrition among children and streamline the donation management process. The system is designed to facilitate early intervention and provide donors with a platform to contribute to improving the health and wellbeing of children.

Physical Design:

We will deploy a web application accessible through any internet-connected device. The application will be hosted on a cloud-based server to ensure easy accessibility to users across different locations. We will secure the server using industry-standard security measures to protect user data and ensure the privacy of sensitive information.

Architecture Design:

Our system will use a multi-tier architecture consisting of presentation, application, and data layers. The presentation layer will render the user interface, the application layer will handle the business logic, and the data layer will manage the storage and retrieval of data from the database.

User Interface Design:

We will design a simple and intuitive user interface with a focus on usability and ease of navigation. Our interface will use modern web design principles and a clean and minimalist layout to make it easy for users to find information. We will design the interface to be responsive, ensuring it is accessible on different devices with varying screen sizes.

Interface Design:

We will implement the system using component and deployment diagrams to ensure scalability, flexibility, and easy maintainability. The component diagram will show the various system components and their interactions, while the deployment diagram will illustrate how the components are deployed across different servers and environments.

3.3 Designing

3.3.1 Physical Design

The hardware and infrastructure necessary to support the software system are part of the physical design of a software project. In the case of the Early Childhood Malnutrition Checking & Donation Management System, the physical design may include the following components:

- Server infrastructure: A centralized server may be necessary to store the database, manage system security and handle incoming requests.

- Cloud-based hosting: Alternatively, the system could be hosted on cloud-based infrastructure, such as Amazon Web Services (AWS) or Microsoft Azure, to provide scalability, reliability, and security.

- Database: The system requires a database to store data on children, midwives, donors, and donations. The choice of database technology depends on factors such as data volume, data complexity, and scalability requirements.

- Security: Security measures such as encryption, access control, and user authentication will need to be implemented to secure the system against unauthorized access, data breaches, and other security threats.

- Backup and recovery: The system should have backup and recovery mechanisms in place to ensure that data can be restored in the event of a disaster, as data loss can pose a significant risk to any system.

Block Diagram

The block diagram for the system includes components such as the User Interface, Donation Management, Nutrition Checking, and Database. The User Interface allows users to interact with the system. The Donation Management component manages donations from donors. The Nutrition Checking component manages the nutritional status of children. The Database stores all data related to the system.

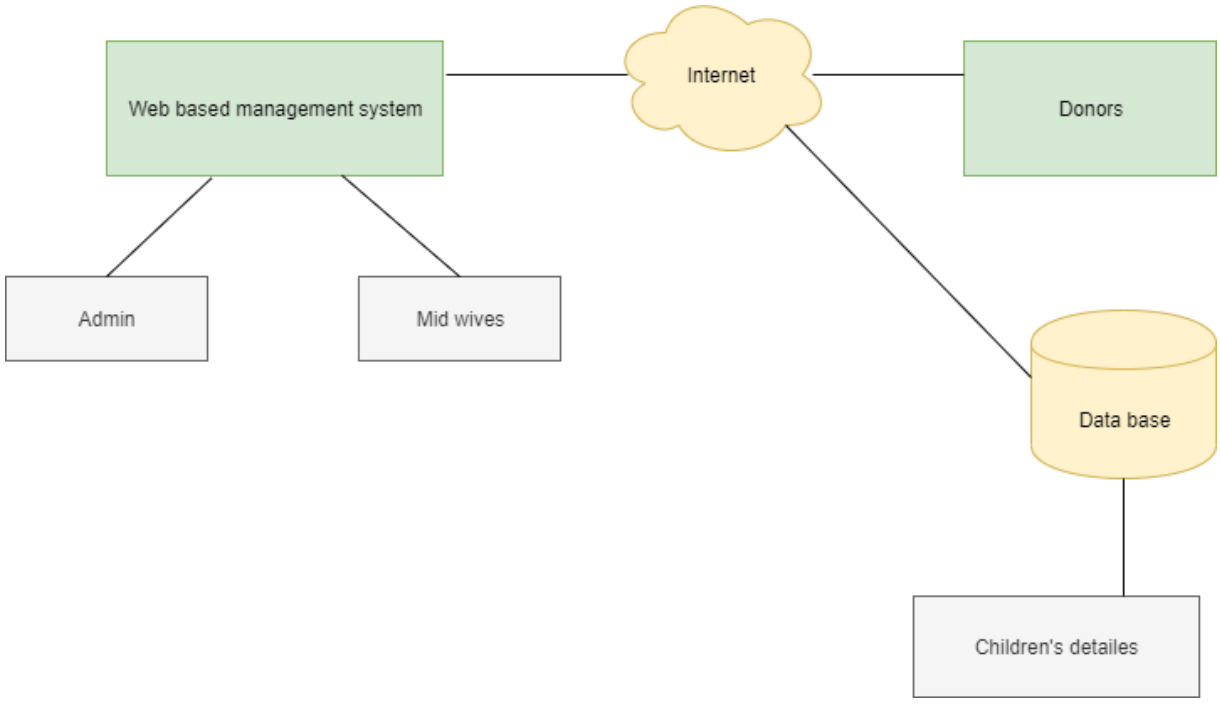

Figure 3.3: Block diagram of whole system

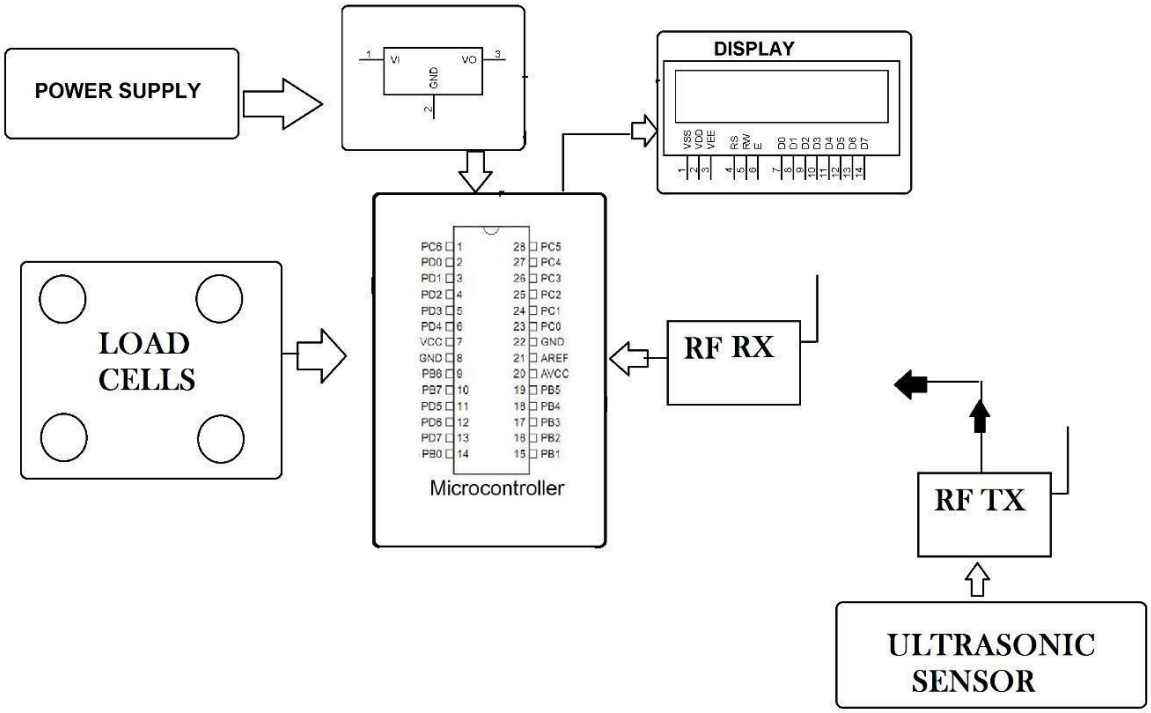

Figure 3.4: Block diagram for Hardware

ER Diagram

The ER diagram for the system includes entities such as Donors, Children, Nutritionists, Donations, and Checks. Donors donate money to the system, which is used to provide nutritional support to malnourished children. Nutritionists check the nutritional status of children and provide recommendations for their diets. The Checks entity stores the nutritional status of the children, which is used to track their progress.

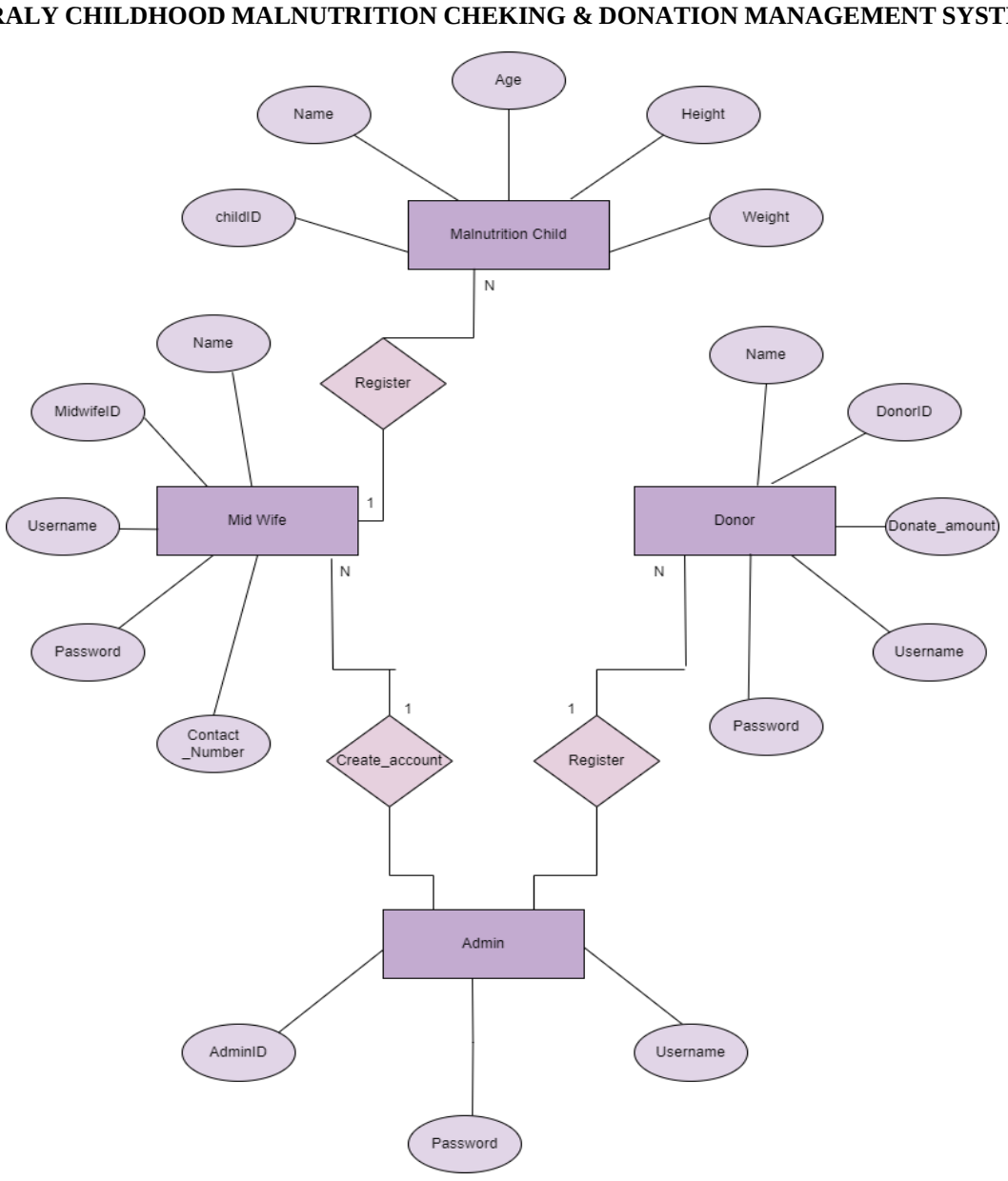

Figure 3.5:ER diagram

Use Case Diagram

The use case diagram for the system includes actors such as Donors, Mid wives and Admin. Donors can donate money to the system and view the status of their donations mid wives can check the nutritional status of children and provide recommendations. Admin can manage the system, view reports, and manage user accounts.

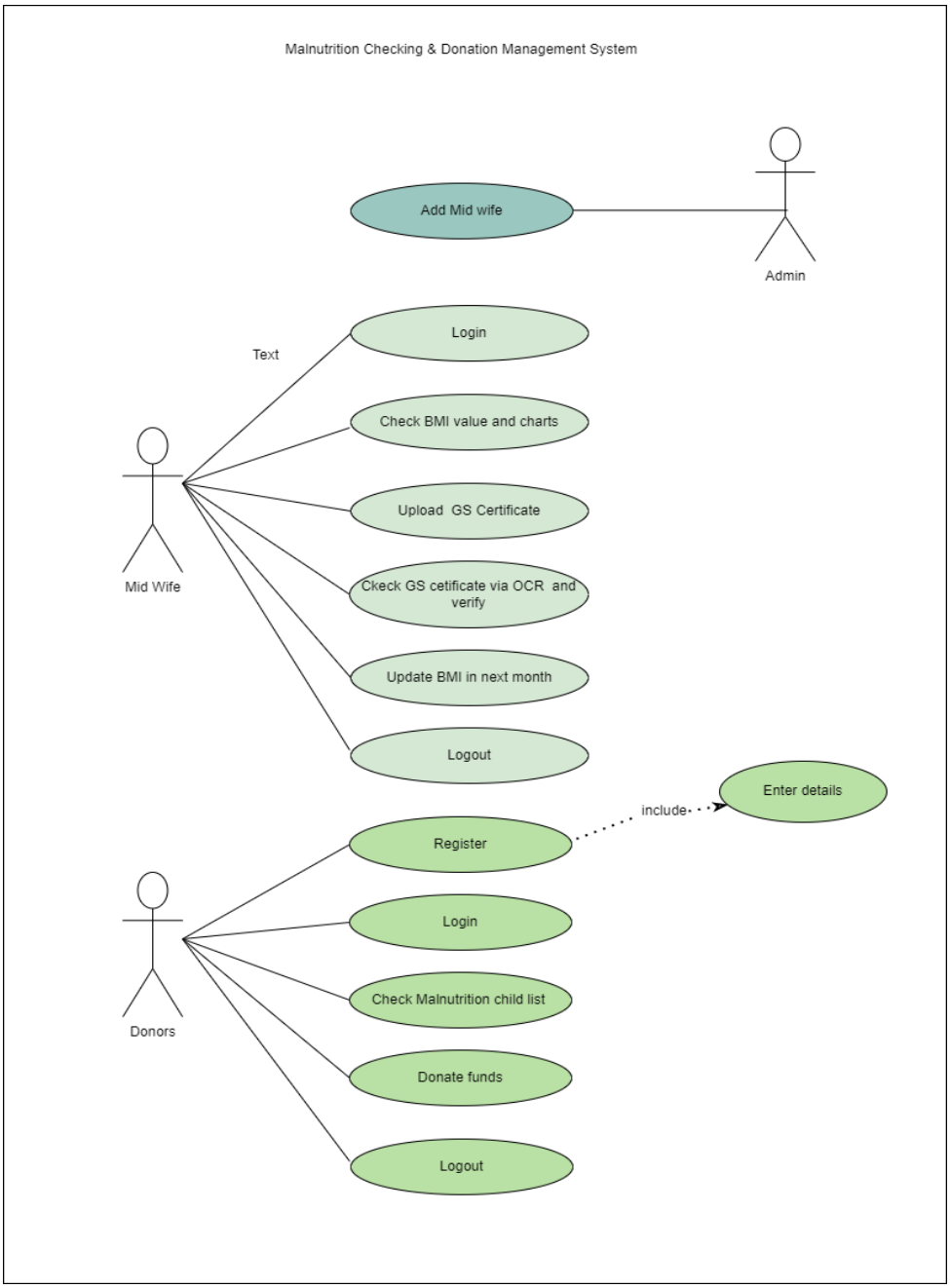

Figure 3.6: Use case diagram

DFD Diagram

The DFD diagram for the Early Childhood Malnutrition Checking and Donation Management System includes processes such as Donate, Check Nutrition, and Manage System. The Donate process allows donors to donate money to the system. The Check Nutrition process allows nutritionists to check the nutritional status of children. The Manage System process allows the admin to manage the system.

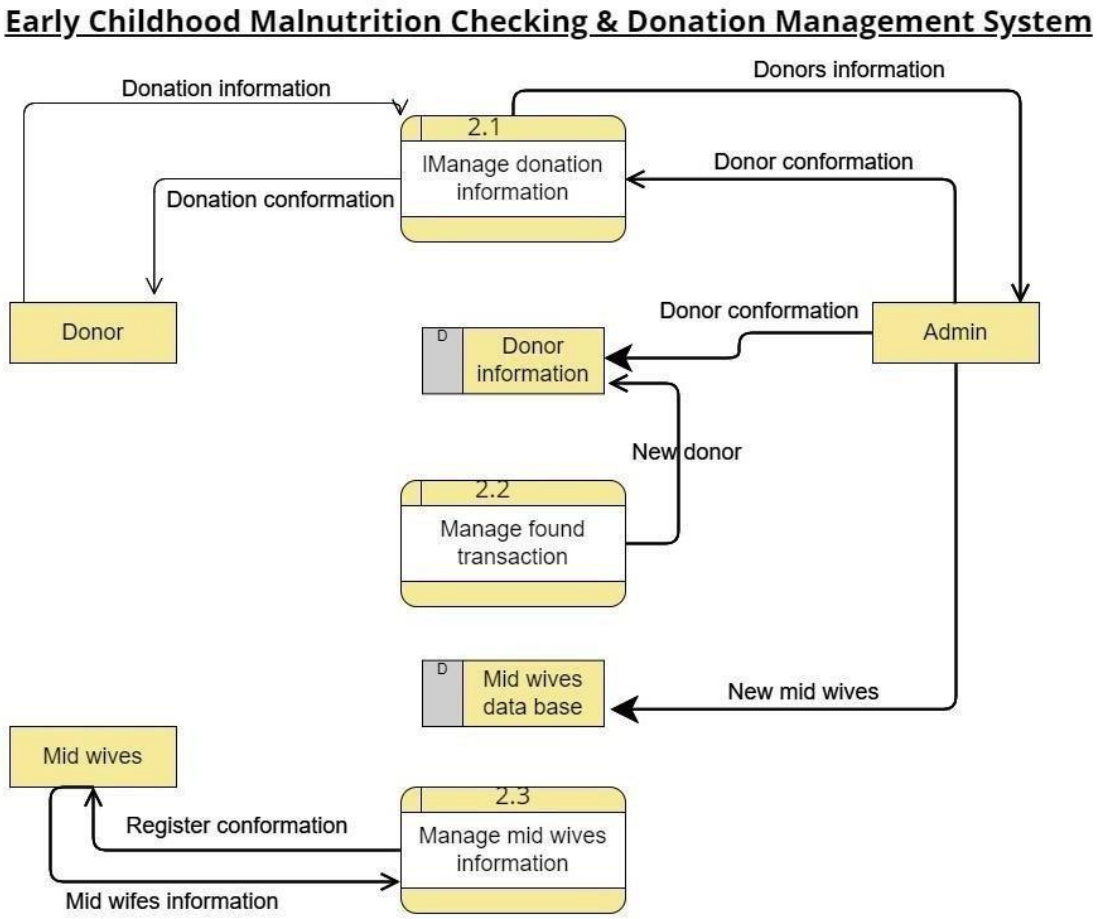

Figure 3.7: DFD diagram (Level 2)

3.3.2 Architecture Design

The Early Childhood Malnutrition Checking & Donation Management System will have an architecture that consists of a linked user interface design to provide a seamless user experience for midwives and donors.

The web application for midwives will have an intuitive and easy-to-use user interface design, including the following features:

- Login page: Midwives can log in to the web application using their unique username and password.

- Dashboard: The dashboard will provide a summary of midwives' activity, including the number of identified malnourished children, the number of children receiving treatment, and the number of children who have completed treatment.

- Screening tool: The screening tool will enable midwives to capture data on malnourished children, including their weight, height, and other relevant medical information.

- Treatment plan: The treatment plan will guide midwives on how to treat malnourished children, providing step-by-step information on the type of food to provide, the quantity of food, and the frequency of meals.

- Report generating: Midwives can generate reports on the number of identified malnourished children and the progress of treatment.

- The web application for donors will also have a user-friendly user interface design, including the following features

- Login page: Donors can log in to the web application using their unique username and password.

- Dashboard: The dashboard will provide a summary of donors' activity, including the amount of money donated, the number of supported children, and the impact of the donation.

- Donation page: The donation page will enable donors to make a one-time or recurring donation to support the treatment of malnourished children.

- Impact assessment: The impact assessment page will allow donors to monitor the impact of their donations, including the number of supported children and the progress of their treatment.

- Reporting: Donors can generate reports on the impact of their donations.

3.3.3 Interface Design

The user interface depicted in the Interface Design figure has been designed to be simple, intuitive, and have a clean, minimalist layout that follows modern web design principles. It has also been made responsive to different screen sizes. The figure illustrates various elements of the interface, such as navigation menus, data input fields, and graphical representations of data. Usability and ease of navigation are the main focus of the design, allowing users to access information effortlessly.

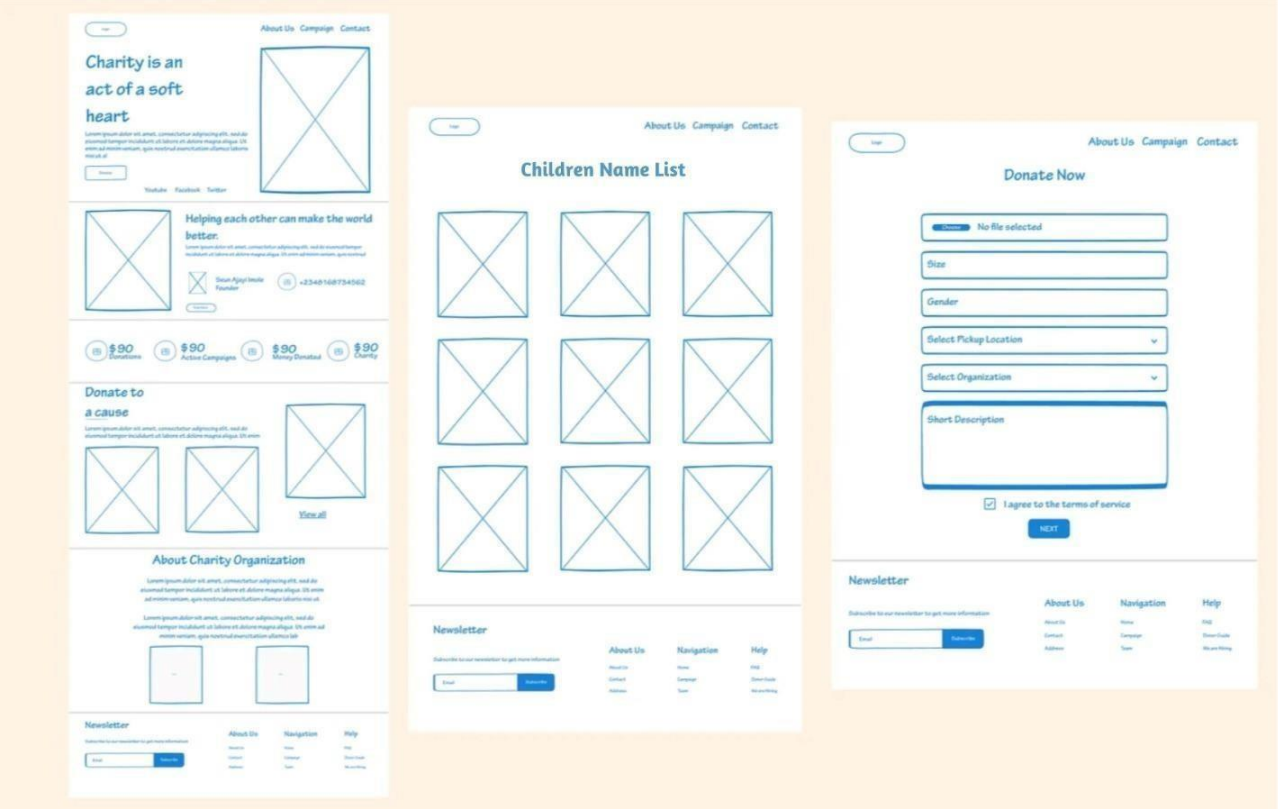

Figure 3.8: Wire frame

The early childhood malnutrition checking and donation management system is an application that helps in identifying malnourished children and managing the donation process. The system has two main components: the malnutrition checking component and the donation management component. The malnutrition checking component allows healthcare workers to check and record the nutritional status of children, while the donation management component allows donors to donate to specific children or groups of children.

To illustrate the implementation of the system using Component and Deployment diagrams, let us first start with the Component diagram.

Component diagram

Malnutrition Checking Component: This component includes the necessary functionalities for checking the nutritional status of children. It consists of two sub-components: the mobile application and the server.

Donation Management Component: This component includes the necessary functionalities for managing donations. It consists of two sub-components: the donation website and the database.

User Management Component: This component is responsible for managing the user accounts and authentication. It consists of two sub-components: the authentication server and the user database.

Notification Component: This component is responsible for sending notifications to donors and healthcare workers. It consists of two sub-components: the notification server and the messaging service.

Data Analytics Component: This component is responsible for analyzing the data collected from the malnutrition checking component. It consists of two sub-components: the data processing server and the data analysis tools.

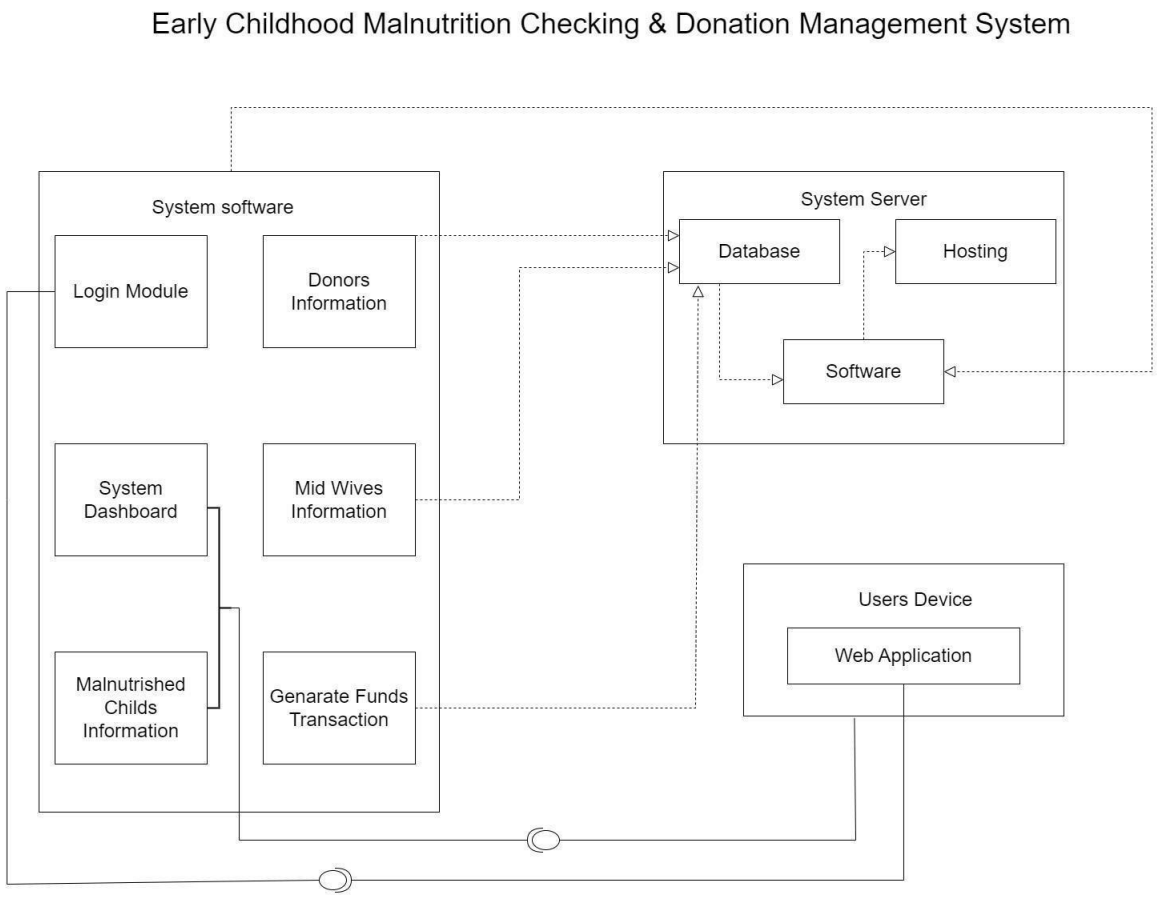

Figure 3.9: Component diagram

Deployment Diagram

The Deployment diagram shows how the components of the system are deployed on hardware nodes. The diagram consists of the following nodes:

Mobile Device: This node represents the mobile devices used by healthcare workers to check the nutritional status of children.

Web Server: This node represents the server used to host the donation website and the authentication server.

Database Server: This node represents the server used to host the user database and the donation database.

Notification Server: This node represents the server used to send notifications to donors and healthcare workers.

Data Processing Server: This node represents the server used to process the data collected from the malnutrition checking component.

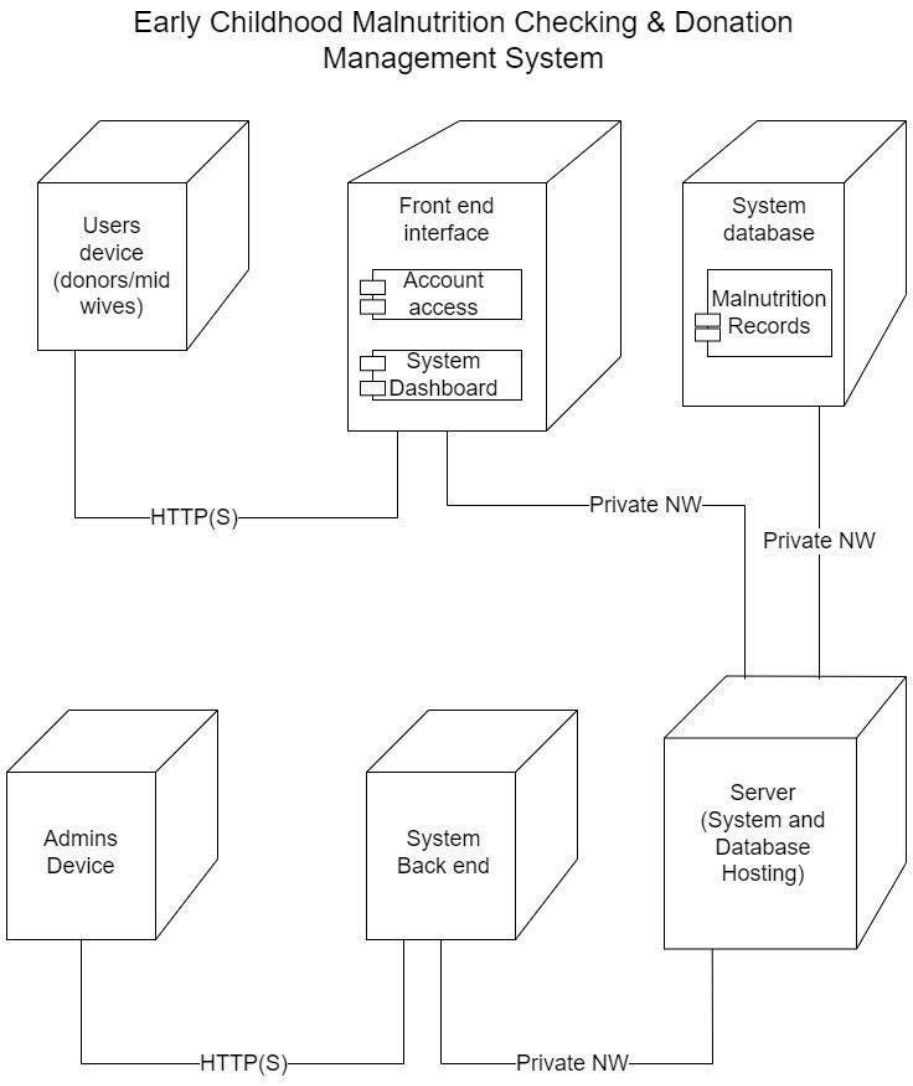

Figure 3.10: Deployment diagram

Languages

Front-end languages are used to create the user interface and user experience of a web application or software system, while back-end languages are used to implement the business logic and server-side functionality.

Front-end languages:

- HTML
- CSS
- JavaScript
- React
- Bootstrap
- Material Design

Back-end languages:

- Java
- Python
- PHP
- JavaScript (Node.js)

Software

- Figma - Figma is a web-based design tool used for creating user interfaces, wireframes, and prototypes. It is commonly used by designers and UI/UX professionals to create and collaborate on design projects.

- VS Code - Visual Studio Code is a code editor that is commonly used by developers to write and edit code for various programming languages. It is a lightweight and flexible tool that supports multiple programming languages, plugins, and extensions.

- KEIL Compiler - KEIL is a compiler that is used for developing embedded systems software. It is commonly used by developers to write, debug, and test code for microcontrollers.

- MySQL - MySQL is a relational database management system that is used for storing and managing large amounts of data. It is commonly used by developers to create and manage databases for web applications and other software systems.

- Arduino IDE - Arduino IDE is an integrated development environment that is used for programming and debugging Arduino microcontroller-based systems. It is

commonly used by hobbyists and DIY enthusiasts to create and prototype their own custom electronics projects.

- Version control systems such as Git for managing the source code and collaborating with the development team.

- Testing frameworks such as JUnit, PyTest, or PHPUnit for conducting unit testing, integration testing, and system testing of the system's components.

Hardware

The hardware components listed appear to be components that might be used in a specific implementation of the Early Childhood Malnutrition Checking & Donation Management System. Here is a breakdown of each component and its potential use:

- Web Cam: A web camera may be used for capturing images of the child's face and measuring the head circumference to calculate malnutrition metrics.

- Digital Scale: A digital scale may be used to weigh the child and determine if they are underweight, which is an indicator of malnutrition.

- Arduino Board: An Arduino board may be used as a microcontroller for collecting and processing data from various sensors used in the system.

- RF Transmitter & Receiver: Radio frequency (RF) transmitters and receivers may be used to wirelessly transmit and receive data between different components of the system, such as the digital scale and the microcontroller.

- Ultrasonic Sensor: Ultrasonic sensors may be used to measure the distance between the child's head and the sensor to calculate head circumference and other malnutrition metrics.

- 8051 Microcontroller: A 8051 microcontroller may be used as a control unit to manage and coordinate data collection and processing from various components of the system.

- Connecting Wires: Connecting wires are used to connect different components of the system and facilitate the flow of data.

- Resistors, Capacitors & Diodes: These components may be used in circuit designs to regulate and control the flow of electrical current and ensure the proper functioning of the system.

3.5 Testing

3.5.1 Unit Testing

The process of testing individual modules or components of the system to verify that they work as intended is known as unit testing. During the implementation phase of the Early Childhood Malnutrition Checking & Donation Management System, each module is tested to ensure that it performs its specific function without any errors.

Unit testing is usually performed by the developers themselves or a dedicated testing team, and an error-free testing environment that simulates the actual production environment is set up. The testing environment should include all the necessary hardware and software components required for the module to function correctly.

During the testing process, the module is subjected to different inputs and conditions to test its functionality and identify any potential errors or bugs. The testing process includes both positive and negative testing scenarios to ensure that the module works as intended under different circumstances.

Once a module passes the unit testing phase, it is considered to be verified and can be integrated with other modules to test the system as a whole. Unit testing is critical for ensuring the quality and reliability of the system, and it helps to identify and fix any potential issues early in the development process.

3.5.2 Integration Testing

Integration testing is the process of testing the system as a whole by integrating all the individual modules or components that were tested during the unit testing phase. The focus of integration testing is to ensure that the set of modules function together without any errors and that they integrate with each other as intended.

During the integration testing phase, the modules are combined, and their interactions are tested. This involves testing the flow of data between the modules and verifying that they communicate correctly. Integration testing includes both functional and non-functional testing scenarios to ensure that the system meets all the specified requirements.

System testing is the final phase of the testing process in the implementation of the Early Childhood Malnutrition Checking & Donation Management System. The focus of system testing is to verify that the system has met both functional and non-functional requirements specified in the design phase.

3.5.3 System Testing

System testing is the final phase of the testing process in the implementation of the Early Childhood Malnutrition Checking & Donation Management System. The focus of system testing is to verify that the system has met both functional and non-functional requirements specified in the design phase

Functional testing is done to ensure that the system meets all the functional requirements specified in the design phase. Non-functional testing is done to verify that the system meets all the non-functional requirements such as performance, security, and usability.

System testing involves testing the system as a whole in a controlled environment that simulates the actual production environment. It helps to identify any issues or bugs that may arise when all the modules are working together and ensures that the system is reliable, efficient, and meets all the requirements specified in the design phase.

Once the system testing phase is completed, the system is considered to be ready for deployment. The system is deployed in the actual production environment, and maintenance and support activities are carried out to ensure its continued functionality and reliability.

Chapter 04: BUDGET

Expected Budget proposal for the Early Childhood Malnutrition Checking & Donation Management System project.

Item	Price (Rs)	Quantity	Total (Rs)
1.Transport Fee (By bus)	550	12	6600
2. AT89S52 (8051 Microcontroller)	850	1	850
3. Weight Sensor	600	1	600
4. HC-SR04 Ultrasonic	550	2	1100
5. RF Tx Rx	340	2	680
6. LCD's	500	1	500
7. Crystal Oscillator	40	2	80
8. Resistors, Capacitors, Transistors, Diodes	200	8	1600
9. Cables & Connectors	250	20	5000
10. PCB	300	1	300
11. LED display	800	1	300
12.Transformer/Adapter	1450	1	1450
13. Push Button	300	2	600
14. Operating system licenses	2000	1	2000

15. Development tools and IDEs	2000	5	10000
16. Cloud hosting	5000	1	5000
17.buy domain	3600	1	3600
18. Printing and stationery	20	20	400
Total			**34720**

Table 4. 1:Expected Budget

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Appendices

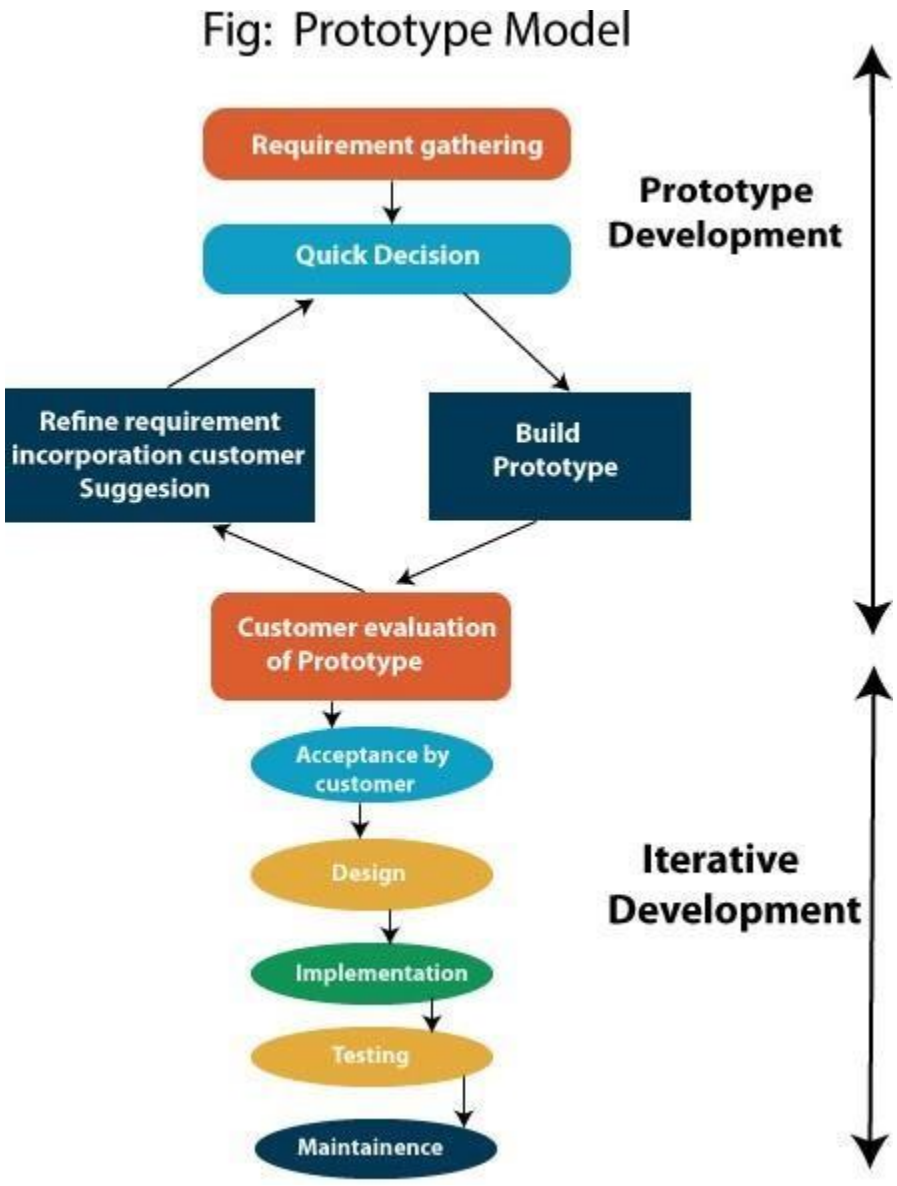

Figure 4.1: Representation of Prototype model

Figure 4.2: Automatic BMI Calculator

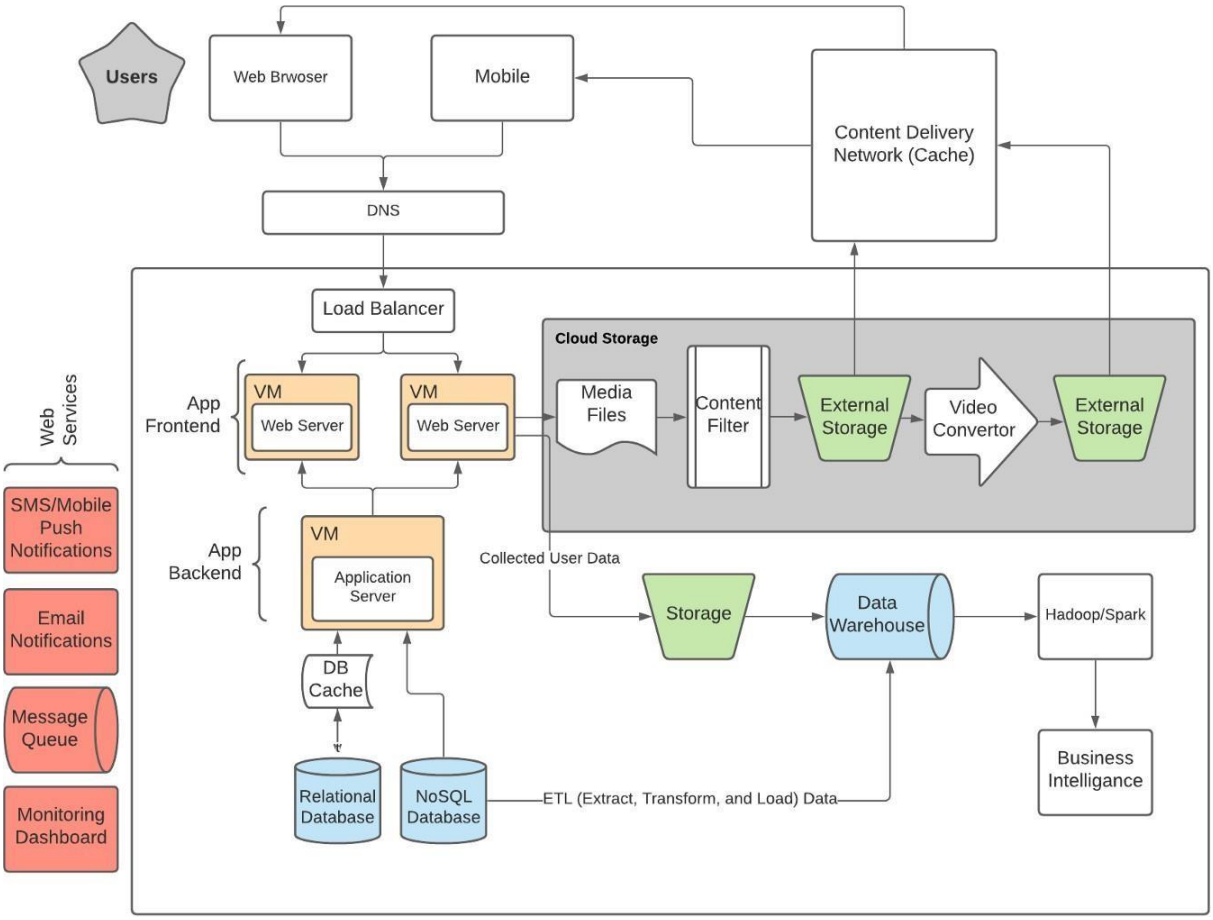

Figure 4.3: Web Application Architecture